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ERP Energy Renovation Path



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Energy Renovation Path (ERP)

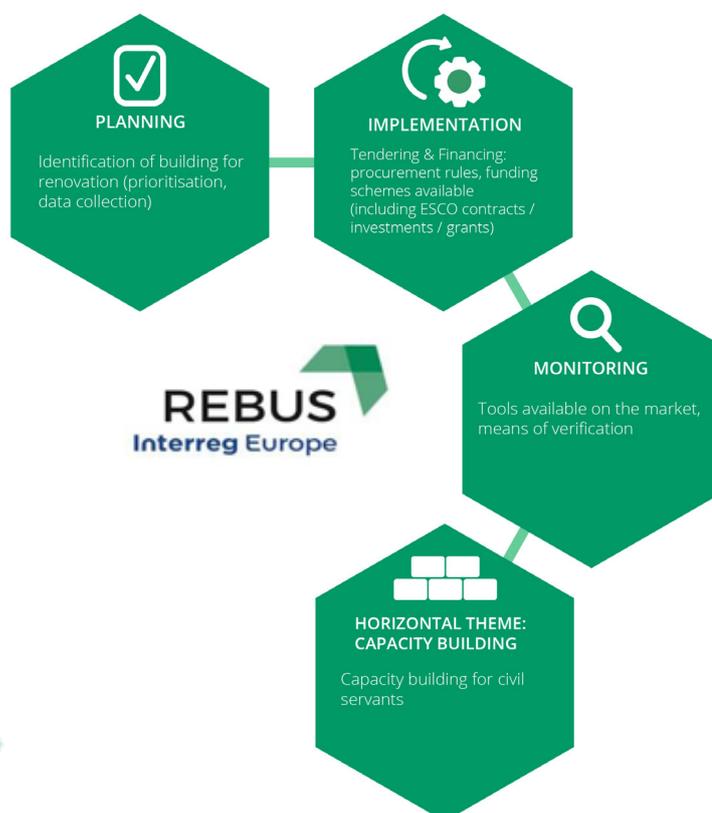
Introduction

What is an Energy Renovation Path?

The Energy Renovation Path (ERP) is a guide that intends to positively influence strategic decisions of public policy makers dealing with energy efficiency renovations in public buildings. This guide was elaborated thanks to the Interreg Europe REBUS project.

What is REBUS?

REBUS is an Interreg Europe project that supports local authorities in planning, implementing and monitoring energy renovation works in public buildings by designing a model Energy Renovation Path (ERP). The ERP can be applied to all renovation projects and helps to overcome most typical challenges encountered in the process. In planning, a lack of reliable information, skills and effective decision-making structures often hinders the process of prioritising buildings to be renovated. In implementation, it affects the public tender process and subsequent works. In monitoring, it leads to difficulties in selecting/using tools that can monitor project impact and post-investment consumption. REBUS uses interregional exchange among different European regions to identify experiences to be included in the ERP, which is the tool REBUS proposes to address the identified needs. Experiences refer to energy efficiency renovations in public buildings, with the focus on four main topics: Planning, Implementing, Monitoring and Capacity Building.



Scope of the document

The REBUS ERP, developed thanks to the interregional exchange, helps public authorities to improve the following aspects of their energy policy content and management:

- Raising awareness on potential savings related to energy renovations of public buildings and improving their energy efficiency;
- Collecting feedback and streamlining data on energy efficiency needs of public buildings;
- Using this feedback to select buildings for renovation;
- Drafting tenders for renovation works that include energy efficiency baselines, targets and monitoring measures;
- Ensuring correct execution, monitoring and verification of implemented energy efficiency measures;
- Managing buildings in a more effective way after renovation;
- Increasing energy awareness and thematic knowledge of all key stakeholders; i.e. local administration, procured contractors, building managers and staff responsible for building maintenance, building users.

The Energy Renovation Path collects experiences from Good Practices identified, including useful tips and guidelines on planning, implementing and monitoring renovation works in public buildings.

The goal of the ERP is to help improve energy performance in order to save energy and thus save money to invest in services for citizens.



Topic 1:



PLANNING

Planning is the vital first phase of the energy renovation process. It is of utmost importance to devote adequate time and resources to project preparation activities as the way they are executed influences all further steps: final selection of energy saving solutions and technologies, selection of the financing model, selection of the contractor, correct implementation of proposed measures and verification of real and long-term results of the project. A poorly implemented project can be always corrected but a poorly prepared project generally cannot be saved. Therefore, when preparing the energy renovation project, consult the check list below to see if all baseline requirements are in place, and then delve deeper into each requirement via the consulting tips, "Dos and Don'ts", useful experiences and good practices identified by the REBUS consortium.



KEY ISSUES TO CONSIDER IN THE PROJECT PLANNING PHASE

STEP 1: Knowing your baseline

- Establish a coherent database of all buildings under your management, which will include both static data¹ and dynamic data². A geo-referenced database is ideal.
- Make sure that the database is regularly updated with verified new data, especially consumption data from meter readings, invoices, smart meters, etc. Verify the data, especially if it is provided by others (e.g. building managers).
- Make sure that your buildings have up-to-date documentation, including energy audits and/or energy certificates. Any documentation can be uploaded in the database for reference.
- When possible, categorise the buildings according to available data (age, type, function) to facilitate the comparison.
- Establish a benchmark between buildings – generally and within each specific building category identified. Which are the biggest energy consumers? Which use more energy than the average in their category? Try to visualise data on a map to best identify or group energy-intensive buildings. Try to find out the reason for this excessive consumption and what can be improved with technical as well as organisational measures. Take notes for future activities.
- Find all “Dos and Don’ts” to know your baseline in the full REBUS ERP report
- Find good practices and other relevant EU experiences for Actions 1-3 in the full REBUS ERP report:

Action 1: Definition of tools for data collection and setting up building inventory/database

Action 2: Collecting data on energy use, energy performance and past renovations of the public buildings

Action 3: Understanding of all important land/ building ownership/ conservation issues

STEP 2: Ensuring availability of necessary skills, capacities & structures

- Establish what skills and expertise are necessary to successfully prepare and carry out an energy renovation project. Can you utilise the necessary skills and expertise within the local administration?
- If not, what can be done to obtain these skills and capacities? Train municipal staff? Hire new personnel? Hire external experts for the project? Cooperate with another municipal or regional authority's technical service?

¹ Static data here refers to the type, area, volume, technical and energy characteristics of the building and its key systems, type and approximate number of users.

² Dynamic data here refers to energy consumption, water consumption and weather reference data; e.g. heating degree days.

- If not done already, consider hiring or appointing a permanent energy manager, who will be responsible for overall energy management and all energy-related projects implemented in a municipality. The cost will pay back quickly!
- It is also worth considering appointing an energy manager and/or setting up an energy team on the building level.
- Find all Dos and Don'ts to ensure the availability of necessary skills, capacities & structures in the full REBUS ERP report
- Find good practices and other relevant EU experiences for Actions 4-6 in the full REBUS ERP report:

Action 4: Ensuring necessary skills and capacities within local administration to successfully prepare, implement and monitor energy renovation project

Action 5: Assigning energy personnel responsible on the building level

Action 6: Ensuring that the energy efficiency perspective is considered in all planning, investment and management activities related to public buildings

STEP 3: Building Prioritisation

- Clearly define the criteria for the selection of buildings for renovation, ensuring adequate balance between economic, environmental and social factors. In principle, the renovations should lead to energy and financial savings with reasonable, reliably calculated payback periods according to the lifetime of the building itself. In some, well-justified cases, however, the rise in consumption may be expected and justified due to the necessity of reaching minimum heating and lighting standards.
- In this case, the achievement of this necessary social factor is also acceptable.
- Base the prioritisation process on real data. Involve experienced experts and employees and relevant stakeholders.
- During selection, use nuanced and holistic views.
- Find all Dos and Don'ts regarding the building prioritisation in the full REBUS ERP report
- Find good practices and other relevant EU experiences for Action 7 in the full REBUS ERP report:

Action 7: Defining criteria for building selection (e.g. the biggest energy consumer in absolute terms or per m²)

STEP 4: Energy Renovation (ER) Team Building

- Ensure that all necessary personnel, representing all relevant departments of local administration (responsible for buildings, investments, energy issues, fundraising, legal issues, etc.) is involved in project preparation. Ensure also the involvement of key stakeholders.
- Constantly improve personnel skills and capacities by organising trainings, encouraging participation in exchange platforms, etc.
- Assign clear roles and responsibilities.
- Establish efficient communication and reporting regimes that ensure a necessary flow of information and fast decision-making.
- Encourage frequent and informal communication. Make sure that all key actors are involved and consulted to ensure sense of shared ownership.
- Ensure high-level and long-term support for the ER team so that they have necessary resources to successfully complete, monitor and evaluate the project.
- Develop different working processes for different types of buildings and different needs.
- Find all Dos and Don'ts regarding the Energy Renovation (ER) Team Building in the full REBUS ERP report
- Find good practices and other relevant EU experiences for Actions 8-9 in the full REBUS ERP report:

Action 8: Identifying and selecting reliable and prepared energy and other experts for ER planning and execution

Action 9: Assigning roles and responsibilities and establishing communication regime

STEP 5: ER Project Preparation

- Determine baseline consumption and baseline characteristics of buildings selected for renovation using proven methods and tools and reliable, bottom-up data.
- Make sure that all necessary building and project documentation is in place and easily available (energy audits and/or energy certificates, feasibility study, etc.)
- Devote adequate time and resources for studying the energy audit/certificate, preparing the investment, conducting economic and financial assessment—such as cost-benefit analysis, LCA or LCCA³—etc. If you do not have the experience or skills to evaluate the documents yourself, seek external help.

³ There is an EU Commission Delegated Regulation on cost-benefit analysis (244/2012/EU): <https://publications.europa.eu/en/publication-detail/-/publication/40347d51-cd2d-4935-9ae1-293171ba12d2>. Additional methods of financial assessment: Life-Cycle Assessment; Life-Cycle Cost Assessment.

- Communicate with and involve all users related to the building (tenants, technicians, users, caretakers, etc.). Discuss with them about internal conditions, thermal comfort and other demands that can be relevant for planned renovation. Encourage shared ownership.
- When selecting and planning energy conservation measures, keep in mind the five requirements for an efficient energy building:
 1. Air tightness
 2. Reduction of thermal bridging effects⁴
 3. Continuous thermal insulation
 4. Ventilation with heat recovery
 5. Higher standards for windows - Investigate good practices in Europe with [Passive House or Net Zero Energy Building standards](#)⁵
- Consider Passive House standards that are the most clearly defined and utilise the Retrofit methodology⁶, including a tool for calculating the energy balance and solutions called PHPP.
- When selecting particular solution/technology, take into consideration not only the current market offer and prices, but also future maintenance and predicted energy costs.
- Carefully estimate energy and financial savings associated with all identified/planned energy saving measures. Identify potential risks hindering achievement of these savings. What can be done to minimise these risks?
- Document the whole process for easier reference in the future.
- Establish an efficient energy monitoring team to be able to observe changes in consumption and evaluate real results of planned measures (the team must be established prior to investment to be efficient).
- Make sure that the final project fits into not only the local environmental/energy strategy but also with other policies and that it is not in conflict with other planned/implemented projects.
- Ensure that the environmental economic and social advantages/ disadvantages are addressed holistically to demonstrate the wider resonance with other policies and plans.

⁴Different EU countries use different measures for thermal bridging. Hungary uses internal dimensions, while Germany uses external dimensions. If a construction joint is considered “thermal bridge free”, it must still be evaluated in Hungary whether or not a detailed energyaudit/certificate is needed.

⁵ Additional standards to look to include the RAL guidelines for installation of windows and external doors or the EAE European guidelines for the application of ETICS (external thermal insulation composite system).

- From the very beginning, raise building users' knowledge and awareness on energy issues (technical energy saving measures are more efficient when combined with behavioural change, so develop ad-hoc campaigns including information on how to use energy more efficiently, how the money saved will be used, etc. Make sure that technical intervention and educational campaign are implemented in parallel). When possible, a user manual can be distributed.
- Remember that sometimes simple measures may bring significant results. Don't underestimate their power.
- Find all Dos and Don'ts for ER project preparation in the full REBUS ERP report
- Find good practices and other relevant EU experiences for Actions 10-19 in the full REBUS ERP report:

Action 10: Ensuring that all necessary building and project-related documentation is gathered and analysed

Action 11: Ensuring involvement of building users from the very beginning

Action 12: Ensuring that planned ER project will be appropriate to businesses and users' needs

Action 13: Selection of energy saving solutions and technologies

Action 14: Ensuring strategy, which will prevent from working with just low hanging fruits

Action 15: Identifying and selecting the best financing options

Action 16: Identification of potential environmental, structural, ecological

Action 17: Establishing efficient monitoring regime

Action 18: Ensuring synergies with other projects, policies, paths

Action 19: Ensuring leadership commitment to providing long term support and resource after project completion

⁵ Additional standards to look to include the RAL guidelines for installation of windows and external doors or the EAE European guidelines for the application of ETICS (external thermal insulation composite system).

⁶Other EU projects that adopt the Retrofit methodology include BUILD UP, NewTrend, EPI SCOPE & TABULA, etc.



Topic 2:

IMPLEMENTATION

The second key step of the project lifecycle is implementation. It involves selection of the contractor(s)—who will be responsible for the installation of agreed upon energy conservation measures—and ensuring quality supervision over the installation process, making sure that energy conservation measures are implemented correctly and timely and that new or modernised systems, installations and equipment items are operated and maintained in a proper manner. As with other steps in energy renovation projects, during implementation, it is important to ensure that relevant stakeholders are involved whenever applicable. This includes the involvement of building maintenance staff, who must be aware of the implemented measures and how to handle the building after their installation.

It is very important to ensure that the contractor—before starting the work—is well familiarised with local conditions, building(s) characteristics and requirements of the building owner/investor. They need to have all the necessary information and documents and be regularly informed. Building owners should ensure that all the arising issues are immediately discussed and decisions are implemented. The works shall be commissioned only after ensuring that the energy conservation measures have been implemented properly, all malfunctions have been identified and removed and steps to ensure long-term operational performance are taken. In case of larger projects, it is worth the time to apply Quality Assurance (QA) procedures and appoint a QA manager.

The building owner may choose to implement the project in a traditional way or by using a PPP/ESCO scheme. Before making the decision, all costs and benefits of these alternative approaches must be carefully analysed and calculated.



KEY ISSUES TO CONSIDER IN THE PROJECT IMPLEMENTING PHASE

STEP 1: Procurement of a good contractor

- Make the decision on the type of procurement (traditional, PPP, etc.)
- Set requirements for the contractor
- Prepare all procurement documentation
- Launch procurement
- Select the contractor
- Find all Dos and Don'ts for procurement of a good contractor in the full REBUS ERP report
- Find good practices and other relevant EU experiences for Actions 1-3 in the full REBUS ERP report:

Action 1: Definition of clear procurement rules stating energy benefits and performances to be reached after work (preferably using green and innovative public procurement principles)

Action 2: Decision on the procurement type (traditional, PPP, ESCO) and development of procurement documentation

Action 3: Ensuring that the contractor has duty to examine and repair all snagging issues, working directly with building technical staff and users

STEP 2: Efficient cooperation with selected contractor

- Establish an efficient communication and cooperation regime
- Improve contractors' capacities (if needed)
- Ensure supervision over the contractors' work
- Provide necessary support
- Find all Dos and Don'ts for efficient cooperation with a selected contractor in the full REBUS ERP report
- Find good practices and other relevant EU experiences for Action 4 in the full REBUS ERP report:

Action 4: Training of and regular meeting with the contractor. Find good practices and other relevant EU experiences in the full REBUS ERP report.

STEP 3: Supervision over implementation of selected energy conservation measures

- Ensure the proper implementation of energy conservation measures
- Ensure correct and efficient operation and maintenance of new/modernised systems, installations and equipment

- Ensure accordance with technical specification
- Establish a regime for identifying and reacting to any problems and malfunctions
- Commission implemented measures
- Find all Dos and Don'ts in the supervision over implementation of selected energy conservation measures in the full REBUS ERP report
- Find good practices and other relevant EU experiences for Actions 5-9 in the full REBUS ERP report:

Action 5: Contracting or appointment of a good and reliable Construction Supervisor

Action 6: Putting in place measures for quality assurance and control (in case of larger projects or parts of larger projects)

Action 7: Ensuring that energy efficiency is prioritised throughout the whole process and whole lifetime of a building

Action 8: Taking advantage of Good Practices available for public administration

Action 9: Taking into consideration different budgets used to finance the building, its operation and investments

STEP 4: Meeting formal requirements

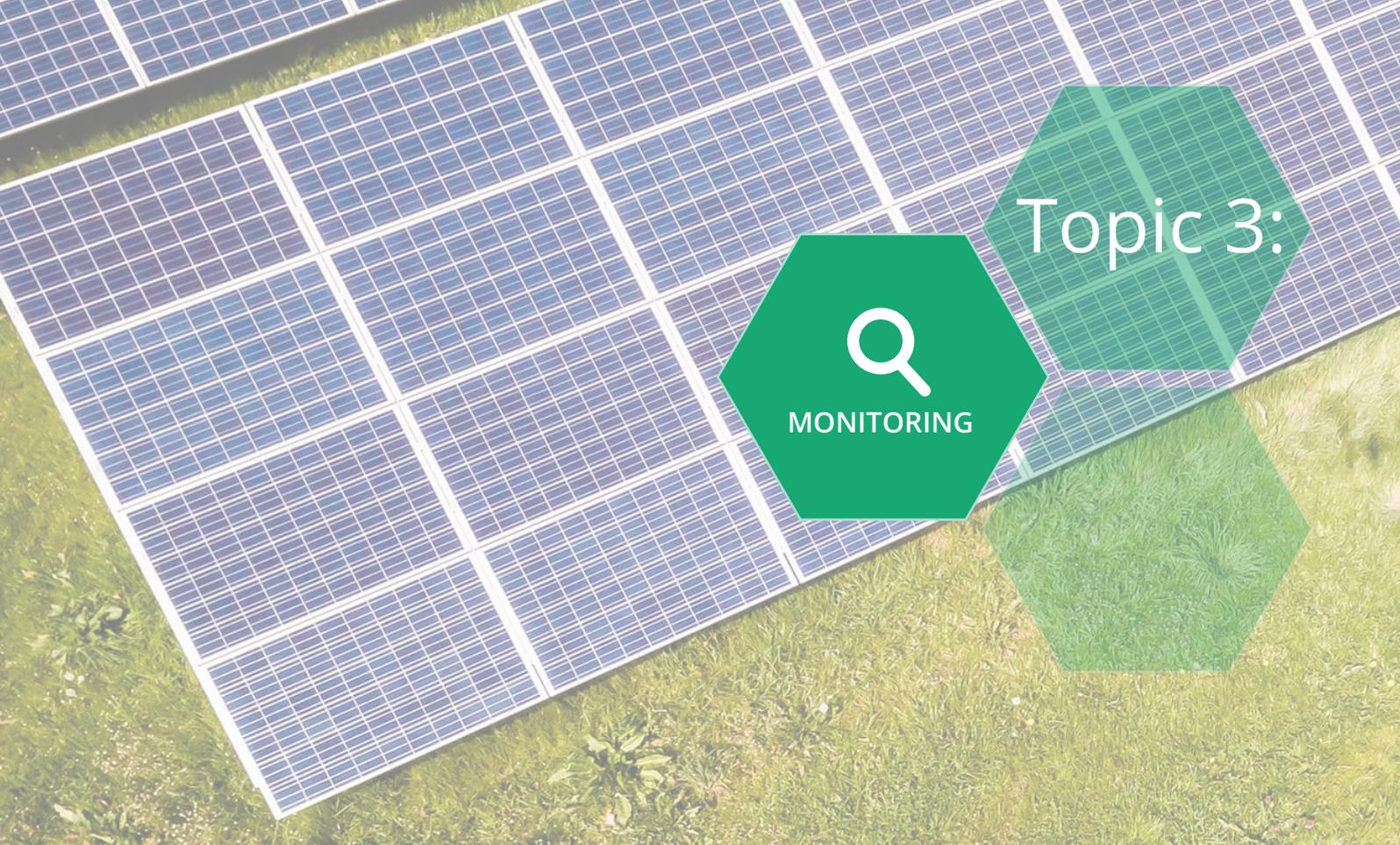
- Ensure all formal requirements will be met; e.g. requirements resulting from national, regional and local regulations, requirements of financing programme/instrument used, internal requirements
- Confirm investment fits into long-term strategies and policies of the municipality/region
- Find all Dos and Don'ts for meeting formal requirements in the full REBUS ERP report
- Find good practices and other relevant EU experiences for Action 10 in the full REBUS ERP report:

Action 10: Ensuring that the project as implemented meets all the formal and other necessary requirements

STEP 5: Involving key stakeholders

- Identify and involve all stakeholders key for the implementation phase
- Find all Dos and Don'ts for involving key stakeholders in the full REBUS ERP report
- Find good practices and other relevant EU experiences for Action 11 in the full REBUS ERP report:

Action 11: Ensuring involvement of key stakeholders, including technical staff (mechanics, electricians, engineers, etc.) in the whole process, also through the organisation of periodic meetings (particularly relevant for large construction projects)



The monitoring phase of the project is very important, yet often underestimated. Solid monitoring not only helps to evaluate the real impact of an implemented project but also to signify the need for and character of any corrective or follow-up actions. Moreover, taking into consideration the cyclical nature of project planning and execution, the lessons learnt and conclusions drawn in the monitoring phase can help to plan and justify further energy saving measures implemented by the municipality. It is important to remember that good monitoring should start already in the planning phase with all necessary structures and procedures planned in advanced to ensure that all relevant data, data sources and tools are in place.

Good monitoring involves establishing solid monitoring structures, assigning clear roles and responsibilities and establishing efficient monitoring and reporting regime. Adequate monitoring tools and monitoring indicators should be considered, including the possibility of using advanced ICT. As always, it is important to ensure involvement of key stakeholders and that the monitoring data is actually verified, analysed, communicated to appropriate decision making bodies and other relevant target groups and used in practice (to evaluate current measures, plan further measures, communicate to the public, raise energy awareness, etc.).



KEY ISSUES TO CONSIDER IN THE PROJECT MONITORING PHASE

STEP 1: Setting up monitoring structures

- Establish efficient monitoring and reporting structures/regime
- Appoint a monitoring team
- Establish monitoring tools/methods
- Assign the necessary time, staff and financial resources
- Find all Dos and Don'ts for setting up monitoring structures in the full REBUS ERP report
- Find good practices and other relevant EU experiences for Actions 1-5 in the full REBUS ERP report:

Action 1: Establishing monitoring structures and regime

Action 2: Clear definition of the regime/system and method (i.e. web) for reporting monitoring results

Action 3: Determination of monitoring tools – setting up reliable monitoring system (i.e. BMS)

Action 4: Establishing work process with the contractor(s) (i.e. Gantt chart – who, how, when?)

Action 5: Securing funding, both for monitoring and for carrying out repairs and maintenance

STEP 2: Ensuring efficient monitoring process

- Ensure efficient monitoring and supervision over the monitoring process
- Include different monitoring indicators and monitoring types (monitoring of building/system energy performance, building/system operational performance, project process itself)
- Ensure feedback from key stakeholders is received
- Find all Dos and Don'ts for ensuring an efficient monitoring process in the full REBUS ERP report
- Find good practices and other relevant EU experiences for Actions 6-9 in the full REBUS ERP report:

Action 6: Identification of data sources, data collection and analysis, benchmarking

Action 7: Ensuring efficient monitoring process

Action 8: Seek feedback and ensure transparent process for responding to feedback

Action 9: Ensure efficient cooperation with specialists from various fields of activity (both within and outside local administration) for monitoring performance indicators

STEP 3: Making use of monitoring data

- Use monitoring data for investment evaluation and planning corrective/follow up measures (if necessary)
- Use monitoring data for ensuring long-term operational performance
- Use monitoring data for planning further energy saving measures
- Use monitoring data for increasing overall energy awareness and knowledge of building users
- Use monitoring data for disseminating the project and its results, communicating successes and learning from mistakes
- Find all Dos and Don'ts for making use of monitoring data in the full REBUS ERP report
- Find good practices and other relevant EU experiences for Actions 10-11 in the full REBUS ERP report:

Action 10: Making practical use of monitoring data

Action 11: Using accessible, non-technical language to inform decision makers, building users and public of project progress and outputs



HORIZONTAL THEME:
CAPACITY BUILDING

Topic 4:

The success of energy renovation projects largely depends on people – i.e. decision makers, municipal staff responsible for energy issues, selected contractors, facility managers and building users. All of these people have important role to play in the process; thus, it should be ensured that they are “energy aware” and well prepared to execute these roles.

Decision makers must have adequate capacities to understand benefits behind and the nature of energy renovation projects to be willing and able to set necessary planning, implementation, monitoring and reporting structures, assign necessary resources and ensure that energy efficiency is well embedded in municipality’s long-term development strategy. Energy aware decision makers will also provide long-term political support and recognition of energy saving efforts.

Municipal staff needs to be well equipped to prepare and supervise energy renovation projects, communicate with the contractor and ensure that achieved results correspond to the projected results, also by engaging with external experts. All relevant municipal departments (not only those directly responsible for energy issues) need to be involved and educated at least to some extent in order to provide an “energy-responsible team” with the necessary financial, legal and communication support.



Since successful implementation of energy conservation measures depends not only on the capacities of municipal staff, but also on the capacities of other key stakeholders (i.e. contractors, consultants, facility managers), key stakeholders are another important target group of capacity building activities, which should be adapted to their needs and potential roles in the project(s). Do not underestimate the role of building(s) maintenance staff – they need to be actively involved in all planned renovations and trained how to operate new or modernised systems, installations and equipment.

Finally, do not forget about the building users. Although not always directly involved in implementation of energy conservation measures, they have significant influence on buildings' energy consumption. Therefore, their overall energy awareness should be increased and their behavioural changes encouraged – this should be done not only within or during implemented energy renovation projects, but also on a regular basis.

There are different methods and tools for transferring energy-related knowledge and building relevant skills and capacities. They should be explored and used according to local needs. Remember that there are no methods/tools that perfectly fit all – it is better to tailor capacity building and awareness raising activities to specific target groups and the impacts that they can actually make. Ensure that available human resources are actually used in energy renovation.

KEY ISSUES TO CONSIDER IN THE CAPACITY BUILDING PHASE

STEP 1: Understanding and following principles of successful capacity building and awareness raising campaigns

- Identify capacity building needs
- Identify and analyse capacity building tools and methods
- Adapt capacity building tools and methods to the needs of specific target groups
- Ensure long-term capacity building and awareness raising processes
- Find all Dos and Don'ts in understanding and following principles of successful capacity building and awareness raising campaigns in the full REBUS ERP report
- Find good practices and other relevant EU experiences for Actions 1-3 in the full REBUS ERP report:

Action 1: Identification of target groups and determination of capacity building targets, methods and tools

Action 2: Organisation of multi-stakeholder meetings (municipal staff, other stakeholders, building users) enabling exchange of experience and opinion

Action 3: Reaching for European funds to support vocational training and skills development for the energy efficiency field

STEP 2: Building capacities of municipal staff

- Ensure the skills and capacities of your own personnel responsible for energy issues (incl. energy renovation projects) are improved
- Ensure the skills and capacities of other personnel involved in energy renovation projects (financing, legal, communication, etc.) are improved
- Find all Dos and Don'ts in building capacities of municipal staff in the full REBUS ERP report
- Find good practices and other relevant EU experiences for Actions 4-7 in the full REBUS ERP report:

Action 4: Organisation of regular training sessions for municipal staff and consultants involved in energy renovation projects

Action 5: Ensuring proper training of internal and external specialists directly involved in energy renovation projects

Action 6: Regular participation in conferences, workshops, webinars, etc. related to each topic

Action 7: Raising awareness on ESCO concept and EE business culture in order to increase interest in the ESCO market

STEP 3: Building capacities and involvement of other stakeholders

- Identify key stakeholders
- Ensure the skills and capacities of stakeholders, including building managers and operational staff, are improved
- Ensure the involvement of stakeholders in the building renovation process
- Transfer knowledge on proper operation of new/modernised systems, installations and equipment to relevant actors
- Find all Dos and Don'ts in building capacities and involvement of other stakeholders in full REBUS ERP report
- Find good practices and other relevant EU experiences for Actions 8-10 in the full REBUS ERP report:

Action 8: Ensuring project legacy so that it is not just another initiative

Action 9: Organising stakeholder meetings surrounding energy efficiency

Action 10: Regular communication on continuous development via multiple communication routes/social networks

STEP 4: Increasing overall energy awareness and changing behaviour of building users

- Communicate with building users on energy issues
- Train building users how to use energy efficiently
- Familiarise building users with new/modernised systems, installations and equipment
- Appoint a monitoring team
- Involve building users actively in energy-saving activities and projects
- Find all Dos and Don'ts for increasing overall energy awareness and changing behaviour of building users in the full REBUS ERP report.
- Find good practices and other relevant EU experiences for Actions 11-12 in the full REBUS ERP report:

Action 11: Organisation of educational campaigns with wider contextual relevance, structured programme and engaging multiple stakeholders

Action 12: Organisation of free campaigns targeting wider public

GOOD PRACTICES identified within REBUS:

1. School carbon reduction programme (Durham) – now called ECO2 Smart Schools

A programme designed to implement energy saving learning and behaviour change within schools. The overall objective of the project is to reduce carbon emissions and costs in schools

2. Big switch off (Durham)

A novel campaign to implement energy saving measures in existing council buildings in order to reduce carbon and energy consumption costs.

3. SEAP-driven energy training for municipal staff to set-up a local energy management agency (Hungary)

An on-site, five-day energy training for municipal staff with the aim to incorporate the content of the local Sustainable Energy Strategy in the everyday operation of the employees of two neighbouring municipalities.

4. New Versilia Hospital and the 3 “Rs” strategy: reduction, regulation and renewable (Tuscany)

An integrated strategy for healthcare facilities towards energy consumption reduction, proper energy system usage and regulation via BMS (Building Management System), plus the integration of renewables.

5. Green Hospital Project (Tuscany)

More efficient and comfortable hospitals through an optimised management focused on the reduction of heat and electricity use.

6. 50/50 Methodology (Poland and Crete)

The 50/50 methodology aims to achieve energy & financial savings by sharing economic incentives from energy savings between schools (50%) and municipalities (50%).

7. Green Roof (Crete)

The green roof implementation on the Town Hall building, providing energy savings and improving comfort conditions for the building users.

8. 2015-2020 Sustainable Energy Action Plan of Buzau Municipality (South-East Romania)

An SEAP to implement local policies including the Urban Development Strategy of the Municipality in the field of energy efficiency and environmental protection.

9. Green University Strategy for TUC (Crete)

Strategy for a “Green University” to sustainably transform the campus via mid and long-term energy reduction measures.

10. Thermal retrofitting of the National Library in Warsaw (Poland)

Thermal retrofitting of the buildings of the National Library in Warsaw combined with installation of BMS (the library occupies a complex composed of 3 units connected with internal gardens).

11. Comprehensive thermal retrofitting programme implemented in Niepołomice (Poland)

An example of a comprehensive thermal retrofitting programme based on the Niepołomice municipality's long-term strategy for sustainable development (planning, implementing, monitoring and capacity building).

12. Mercury Project for building monitoring center (Malmö)

The Mercury project brought together discrete Building Management Systems (BMS) into a singular system, thus providing significant savings and simplifying monitoring.

Abbreviation List

AFE –	Regional Agency for waste & resource management; formally known as the Florentine Energy Agency (REBUS Partner)
APSE –	Association for Public Service Excellence (UK)
BMS –	Building Management System
BORA 94 –	Borsod-Abaúj-Zemplén County Development Agency Nonprofit LLC; Hungary (REBUS Partner)
CEE –	Central and Eastern European (countries)
CET –	Tuscany Energy Consortium in Italy
CHP –	Combined Heat and Power, or cogeneration, refers to the use of a heat engine or power station to generate electricity and heat (to be utilised) at the same time.
CRES –	Centre for Renewable Energy Sources and Saving in Greece
DCC –	Durham County Council; UK (REBUS Partner)
DHW –	Domestic Hot Water
E4 –	The specific system used by the City of Malmö for monitoring energy usage
EAE –	European Association for external thermal insulation composite systems (see ETICS).
EE –	Energy Efficiency
Epgl, nren –	(Italian abbreviation) In Italy, the energy performance index (EPgl, IPE, EPgl, nren), also known as the Consumer Index, is an architectural parameter that expresses the total consumption of primary energy for air conditioning (in a continuous system, 24h) referred to the unit of useful surface (expressed in kWh/m ² per year).
ER –	Energy Renovation; i.e. ER Team
ERP –	Energy Renovation Path
ETICS –	External Thermal Insulation Composite System. ETICS increase the energy efficiency of buildings.
GP –	Good Practice
GSE –	GSE Italia, a GSE Group subsidiary, is an engineering company specialised in the design and construction of turnkey projects for head offices, industrial buildings, logistics platforms and R&D centres.
HVAC –	Heating, Ventilation and Air Conditioning
ICT –	Information and Communications Technology
ISO 50001 –	A specific organisation for assisting with the development of Energy Management Systems
ISO –	International Organisation for Standardisation
KENAK –	The Regulation on the Energy Performance of Buildings in Greece, which sets an integrated energy design in the building sector that promotes energy efficiency documentation of buildings.

LCA/LCCA –	Life Cost Benefit Analysis, or Life Cycle Cost Analysis. There is an EU Commission Delegated Regulation on cost-benefit analysis (244/2012/EU).
LEAP –	Local Energy Action Plan (Poland)
LED –	Light-emitting diode. A light-emitting diode (LED) is a semiconductor light source that emits light when current flows through it.
M&E –	Monitoring and Evaluation
NEPO –	One of the largest energy buyers and providers of energy solutions to the public sector (UK).
NGO –	Non-Governmental Organisation. A non-profit organisation that operates independently from the government.
Norm C107/2005 –	A Romanian methodology of determining the heating energy consumption per volume
Norm MC001/2006 –	In Romania, “The Methodology for the calculation of the Energy Performance of the Building”
PAED –	The Sustainable Energy Action Plan (SEAP) specific to the South-East Region of Romania-Buzau
PHPP –	Within Passive House standards and Retrofit methodology, a tool for calculating the energy balance and solutions
PNEC –	Association of Municipalities Polish Network „Energie Cités”; Poland (REBUS Partner)
PPC –	Public Power Cooperation. PPC is the largest electric power company in Greece.
PPP/ESCO (scheme) –	Public-private partnership scheme. Public-private partnerships (PPP) are in essence the ESCO model applied to public institutions. ESCO is the multilingual European classification for skills, competences, qualifications and occupations. ESCO is part of the Europe 2020 strategy. In order to determine energy efficiency (EE) potential and achieve the energy savings goals in buildings, there is a necessity to adopt new ESCO business models.
PV –	Photovoltaic. Solar PV refers to solar panels, a technology used to convert energy from the sun into direct current electricity.
QA –	Quality Assurance
RAL –	Quality Mark and seal of the German RAL Institute. Within REBUS, RAL refers to the measure of quality regarding the installation of windows and external doors.
REBUS –	Renovation for Energy efficient BUildingS (Interreg Europe Project). The overall objective of the REBUS project is to improve the capacity of public authorities in European regions, to undertake efficient renovation works of their public building stock, thus saving energy and public resources.
RES –	Renewable Energy Sources



ROC –	Regional Energy Officers. ROC forms a network of Energy Officers from across the northeast of England.
ROI –	Return on Investment. ROI is usually expressed as a percentage and is typically used for personal financial decisions, to compare a company's profitability or to compare the efficiency of different investments.
SAP –	Standard Assessment Procedure. UK Gov Definition - The Standard Assessment Procedure (SAP) is the methodology used by the Government to assess and compare the energy and environmental performance of dwellings. Its purpose is to provide accurate and reliable assessments of dwelling energy performances that are needed to underpin energy and environmental policy initiatives.
SEAP –	Sustainable Energy Action Plan
SECAP –	Sustainable Energy and Climate Action Plan
SERDA –	South-East Regional Development Agency; Romania (REBUS Partner)
SME –	Small and medium-sized enterprises
TOP –	Targeted Policy Instrument
TUC –	Technical University of Crete



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